

Remarks

Claims 1-43 are pending in the application. Claims 23-43 have been allowed. Claims 1-22 are now rejected under 35 U.S.C. §§ 102(b) and 103(a) in view of Ernsberger, Morris and Schueller. In view of the following remarks, reconsideration and withdrawal of these grounds of rejection is requested.

Claim Rejections Under 35 U.S.C. § 102

Claims 1 and 5 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Ernsberger et al. ("Colaminated Single and Multichip Package Development"). In view of the following remarks, reconsideration and withdrawal of this ground of rejection is respectfully requested.

The present invention comprises, in one exemplary embodiment, a microwave/millimeter wave circuit 110 (See Figs. 1a and 1b). The circuit includes a first metallization layer 112a, a second metallization layer 112b, and a dielectric layer 117 sandwiched therebetween. The circuit also includes at least one conductive via 119 extending from the first metallization layer 112a to the second metallization layer 112b, through the dielectric 117. The conductive via 119 extends through the first and second metallization layers 112a, 112b, as well as through the dielectric layer 117. An interior surface of the conductive via 119 is plated with an electrically conductive material 119p to provide an electrical connection between the first and second metallization layers 112a, 112b. An interior portion of the conductive via 119 is free of any electrically conductive material 119p.

Claim 1 now recites:

A multilayer microwave or mm-wave circuit comprising: a first metallization layer, at least a portion of said first metallization layer adapted for operation at a frequency ranging from 20GHz to 100 GHz; a second metallization layer, at least a portion of said second metallization layer adapted for operation as a ground plane; a dielectric substrate layer, said dielectric substrate layer disposed between said first and second metallization layers; and a plurality of conductive vias extending through said dielectric substrate layer

and through said first and second metallization layers and electrically connecting portions of said first and second metallization layers, wherein an interior surface of said conductive vias is plated with an electrically conductive material and a central portion of said conductive vias is substantially free of electrically conductive material, said multilayer microwave or mm-wave circuit being a flexible circuit.. [emphasis added].

Thus, claim 1 presently requires a “flexible” circuit including a “first” and “second” metallization layers, a “dielectric” layer between the metallization layers, and vias “extending through” the dielectric layer and metallization layers which include electrically conductive material on an interior surface only (emphasis added). As discussed below, Ernsberger fails to disclose or suggest such an invention.

Ernsberger teaches a colaminated circuit package which includes first and second “layer pairs” disposed on either side of a dielectric layer (e.g., ViaPly™) (See Fig. 1). The layer pairs each comprise a layer of unspecified material with metallization structures formed thereon, and therein. The dielectric layer includes a plurality of vias formed therein which are completely filled with “material that will sinter during lamination” (see, page 135, col. 2, lines 1-14). The layer pairs are bonded to the dielectric layer by pressing all the layers together and heating the combined structure until the metallization structures on the layer pairs and the material in the vias melt together to form a “dense, metallurgically-bonded electrical connection between [the] layer pairs.”

Ernsberger fails to disclose, teach or suggest a flexible circuit with vias “extending through” first and second metallization layers, and which have an inner surface thereof plated with an electrically conductive material, wherein a central portion of the vias are “substantially free of electrically conductive material” (emphasis added). As noted above, Ernsberger teaches vias which extend only through the dielectric (e.g., ViaPly™) layer. The vias in the dielectric layer do not “extend through” the ‘layer pair’ layers in any way. Further, Ernsberger teaches that such vias in the dielectric layer are “fill[ed]...with a material that will sinter during lamination”; Ernsberger does not disclose or suggest a portion of the vias which are “substantially free from

electrically conductive material.” Accordingly, reconsideration and withdrawal of this rejection with respect to claim 1 is respectfully requested.

Similar to independent claim 1, independent claim 5 now includes limitations specifying vias which “extend through” both the dielectric layer and the metallization layers, and which include electrically conductive material on an interior surface only. Hence, for at least those reasons discussed above with respect to claim 1, reconsideration and withdrawal of this ground of rejection with respect to claim 5 is also respectfully requested.

Claims 1 and 5 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Morris (U.S. Pat. No. 6,486,408). In view of the following remarks, reconsideration and withdrawal of this ground of rejection is respectfully requested.

Applicant submits herewith two (2) Affidavits of Prior Invention Under 37 C.F.R. 1.131 (“Affidavits”) which overcome the rejection under Morris. Particularly, the Affidavits show that the named inventors on the present application had possession of the invention at least as early as September 15, 1999, over one (1) year before the filing of the ‘408 Patent. Accordingly, reconsideration and withdrawal of this ground of rejection with respect to claims 1 and 5 is respectfully requested.

Claim 1 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Schueller (U.S. Pat. No. 5,585,162). In view of the following remarks, reconsideration and withdrawal of this ground of rejection is respectfully requested.

Schueller teaches a flexible circuit 20 for use with solder balls 26 which includes a ground plane 22, a circuit trace 36, and at least two vias 30, 38. A polyimide base 28 separates the ground plane 22 from the circuit trace 36 in certain areas of the circuit 20.

Schueller fails to disclose, teach or suggest a flexible circuit with vias “extending through” first and second metallization layers, and which have an inner surface thereof plated with an electrically conductive material, wherein a central portion of the vias are “substantially free of electrically conductive material” (emphasis added). Schueller teaches vias 30, 38 which are formed by the deformation of a ground plane 22. The vias 30, 38 do not “extend through” the ground plane 22, or the circuit trace 36. Additionally, the vias 30, 38 taught by Schueller are not

“plated with an electrically conductive material.” Finally, Schueller does not disclose or suggest a portion of the vias 30, 38 which are “substantially free from electrically conductive material.” Therefore, reconsideration and withdrawal of this rejection with respect to claims 1 and 5 is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

Claims 2-4 stand rejected under 35 U.S.C. § 103(a) as being obvious over Ernsberger, Morris or Schueller taken alone. Since the § 102(e) rejection under Morris is subject to withdrawal based on the presently-filed Affidavit, only the Ernsberger and Schueller rejections are addressed below. In view of the following remarks, reconsideration and withdrawal of this ground of rejection is respectfully requested.

As noted above, Ernsberger and Schueller fail to disclose or suggest a flexible circuit with vias “extending through” first and second metallization layers, and which have an inner surface thereof plated with an electrically conductive material, wherein a central portion of the vias are “substantially free of electrically conductive material,” as recited in claim 1. Since claims 2-4 are all dependent upon claim 1, and Ernsberger and Schueller fail to meet the limitations of claim 1 as discussed above, reconsideration and withdrawal of this ground of rejection with respect to claims 2-4 is requested.

Claims 6-22 stand rejected under 35 U.S.C. § 103(a) as being obvious over Ernsberger taken alone. In view of the following remarks, reconsideration and withdrawal of this ground of rejection is respectfully requested.

As noted above, Ernsberger fails to disclose or suggest a flexible circuit with vias “extending through” first and second metallization layers, and which have an inner surface thereof plated with an electrically conductive material, wherein a central portion of the vias are “substantially free of electrically conductive material,” as recited in claims 1 and 5. Since claims 6-22 are all dependent upon claims 1 and 5, and Ernsberger fails to meet the limitations of claims 1 and 5 as discussed above, reconsideration and withdrawal of this ground of rejection with respect to claims 6-22 is requested.

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Conclusion

In view of the foregoing remarks, Applicants submit that this application is in condition for allowance at an early date, which action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "P. A. Taufer", written over a horizontal line.

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